

Diagnostic Stewardship of the Fungal Ab Panel

Briana Castillo, MD

Nikolaos Mavrogiorgos, MD, Melissa Miller, Ph.D., Anne Lachiewicz, MD,
Lindsay Daniels, PharmD, Carlton Moore, MD



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Diagnostic Challenges with Fungal Pneumonia

- A 62-year-old female with AML was admitted to UNC with acute hypoxemic respiratory failure and fever. Given her immunocompromised state, the suspicion of a fungal infection was high. A CT chest scan without contrast raised concerns for a fungal etiology.
- Due to her profound thrombocytopenia and high oxygen requirements, traditional diagnostic methods such as bronchoscopy and biopsy were not feasible.
- In an attempt to obtain a diagnosis, several non-invasive fungal tests were ordered, including:
 - Crypto Ag
 - Serum Fungitell
 - Serum Aspergillus galactomannan
 - Histoplasma Urinary Ag
 - Fungal Ab panel

Diagnostic Challenges cont.

- Positive results within the panel led to the initiation of broad-spectrum antifungal therapy. However, the reliability of this result was questionable.
- Subsequent convalescent titers taken two weeks later were negative, revealing the initial test result to be a false positive.
- This false positive diagnosis resulted in:
 - Unnecessary exposure to broad-spectrum antifungal drugs with potential side effects
 - Additional, avoidable consultations and healthcare costs
 - Delayed diagnosis

FUNGAL ANTIBODIES	
Coccidioides AB	Negative
Coccidioides IgG	Negative
Coccidioides IgM	Negative 
Blastomyces Ab	Equiv...  
Blastomyces Immunodiffusion	NEGATIVE 
Histoplasma Ab Mycelial CF	1:32 
Histoplasma Ab Yeast CF	1:64  
Histoplasma Ab, Immunodiffusion	Negative 

FUNGAL ANTIBODIES	
Coccidioides Complement Fixation	Negative
Coccidioides Immunodiffusion IgG	Negative
Coccidioides Immunodiffusion IgM	Negative 
Blastomyces Ab	Negative 
Histoplasma Ab Mycelial CF	Negative
Histoplasma Ab Yeast CF	Negative
Histoplasma Ab, Immunodiffusion	Negative 

Fungal Antibody Panel

Histoplasma Antibody

Blastomyces EIA

Coccidioides Antibody EIA

Aspergillus Antibody

Histoplasma Complement Fixation

Histoplasma Immunodiffusion

Negative

Positive or Equivocal

Negative

Positive

No further testing

No further testing

Reflex to Immundiffusion

Coccidioides Complement Fixation

Coccidioides Immunodiffusion

Yeast Antibody Compliment Fixation

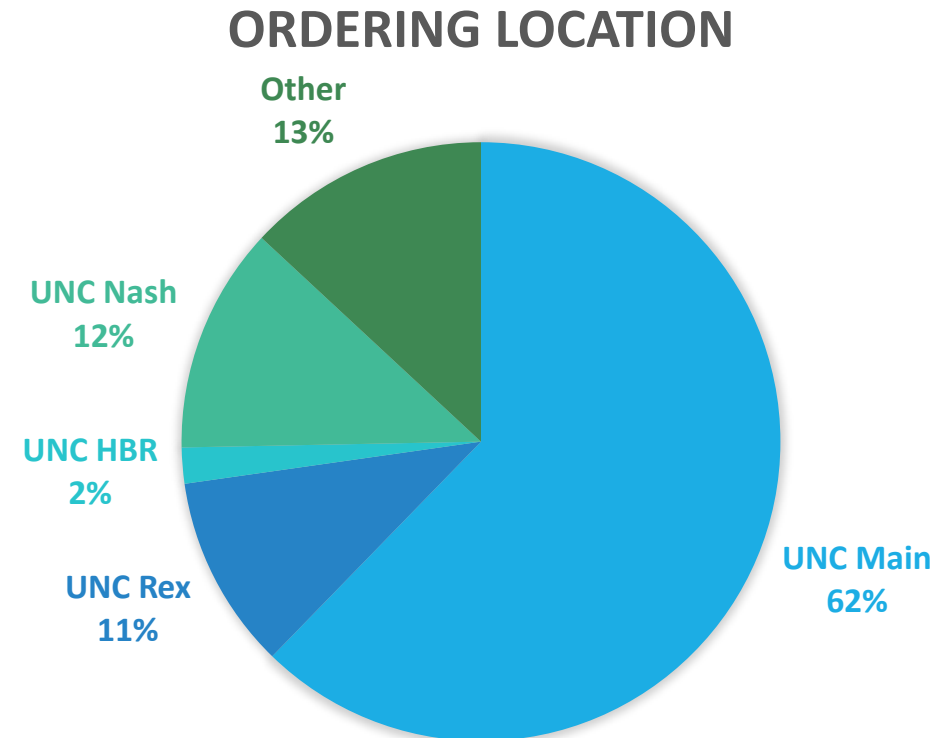
Mycelial Antibody Compliment Fixation

Background

- Ordinarily, these individual tests should be ordered based on patient exposure and suspicion for underlying syndromes.
- Given high cross-reactivity rates, positive results are challenging to interpret and often to lead to further confusion and potentially inappropriate treatment.
- Updated guidelines offer alternative and improved non-invasive testing for dimorphic fungi.
- Average cost: \$271 per panel
- Negative results do not rule out dimorphic fungal infections, positive results do not establish a diagnosis nor differentiate between active infection or prior exposure.
- As Epic spreads to our affiliate hospitals, providers who want to order one test are forced to order the entire panel. Results may be confusing to interpret. Some affiliates do not have access to ID providers.
- Rarely does a patient meet criteria to warrant testing for all 4 clinical syndromes.

Academic Year 2022-2023 Data Analysis

- **Histoplasma Ab**
 - 14 (2.5% of all tests) positive
 - 2 of the 14 patients had true diagnoses/treatment (both had positive culture or path)
- **Blastomyces Ab**
 - 30 (6% of all tests) reflexed to confirmatory immunodiffusion
 - Only 1 confirmatory test positive (true diagnosis, culture positive)
- **Coccidioides Ab**
 - 12 (2% of all tests) positive
 - 2 of 12 patients with true diagnoses/treatment (both had positive cultures)
- **Aspergillus fumigatus IgG**
 - 13 (2%) positive
 - 4 of 13 patients had true diagnoses/treatment for chronic pulmonary aspergillosis.



Goals/Aims



Estimate number of panels sent to Mayo between July 1, 2022-2023 ~ 568. Estimate cost: \$143k per year.



We hope through appropriate education, clinical decision tools, and altering the test panel to reduce utilization of Coccidioides, Aspergillus, and Blastomyces Antibody tests by at least 50%.

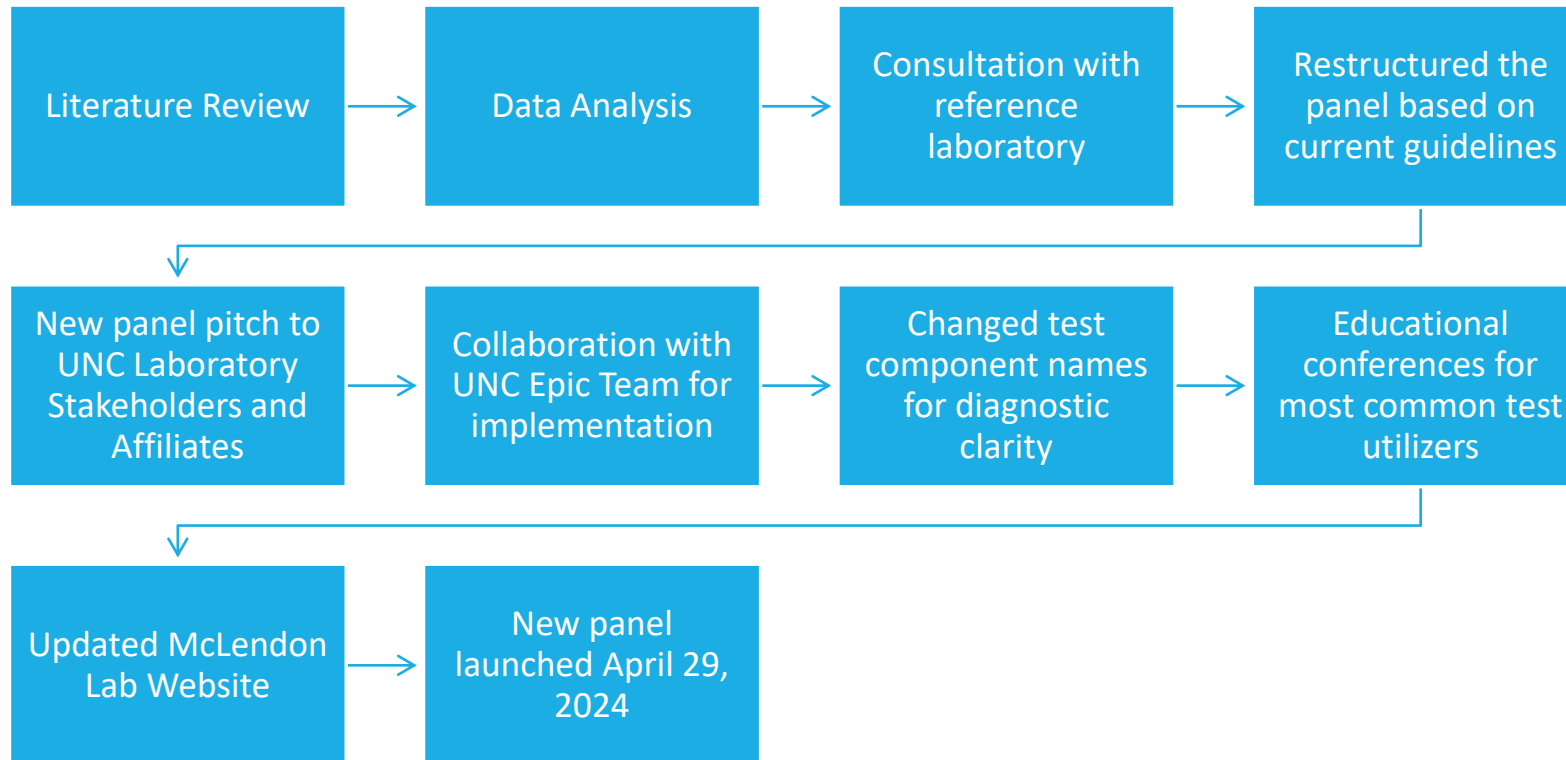


Enhance patient care through accurate and timely diagnoses.



Reduce unnecessary healthcare costs associated with inappropriate testing.

Improvement Process



New Panel

HISTOPLASMA/BLASTOMYCES AB/AG

✓ Accept

Initial non-invasive testing for Histoplasma should include combined antibody and antigen testing. If clinical suspicion persists despite initial negative tests, please order convalescent titers with Histoplasma Antibody alone 2-3 weeks from the original test. Antibody titers are not recommended to monitor response to treatment.

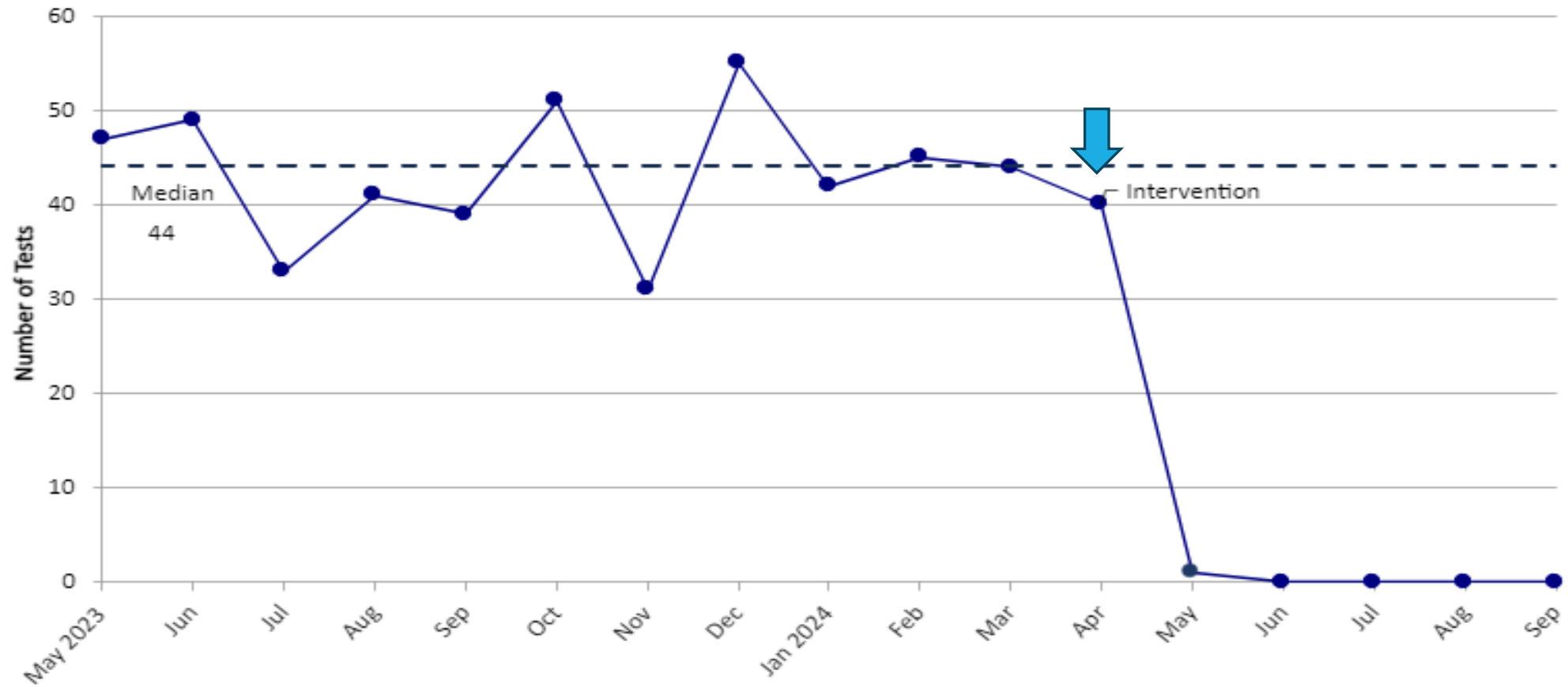
For initial diagnosis of Blastomycosis, Blastomyces Urine Antigen testing is recommended. Blastomyces has extensive cross-reactivity with Histoplasma and are now consolidated into one test.

Culture/biopsy remains gold standard for diagnosis.

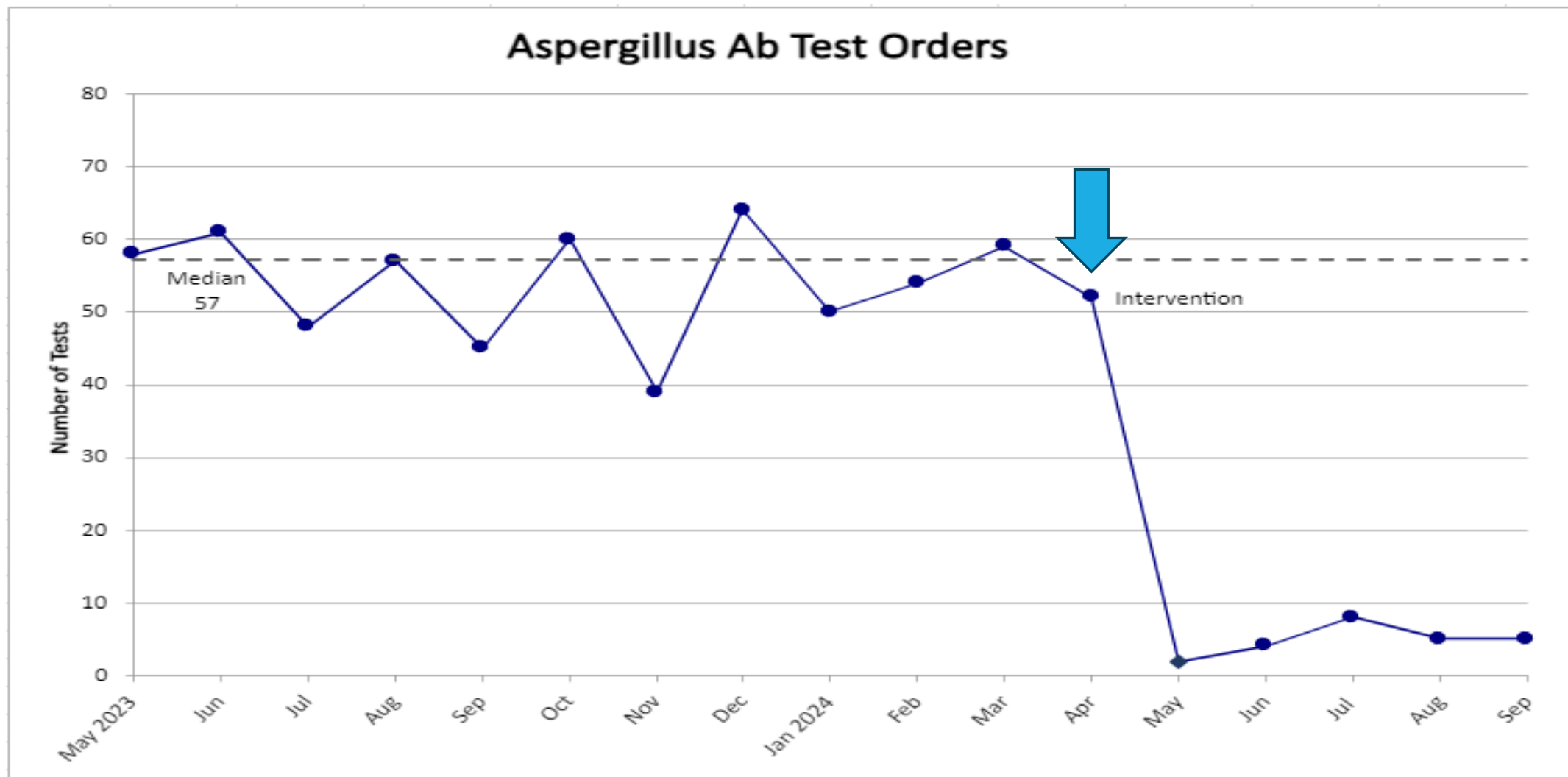
Histoplasma Antibody
Once, today at 0844, For 1 occurrence

Histo/Blasto Antigen, Urine
Once, today at 0844, For 1 occurrence

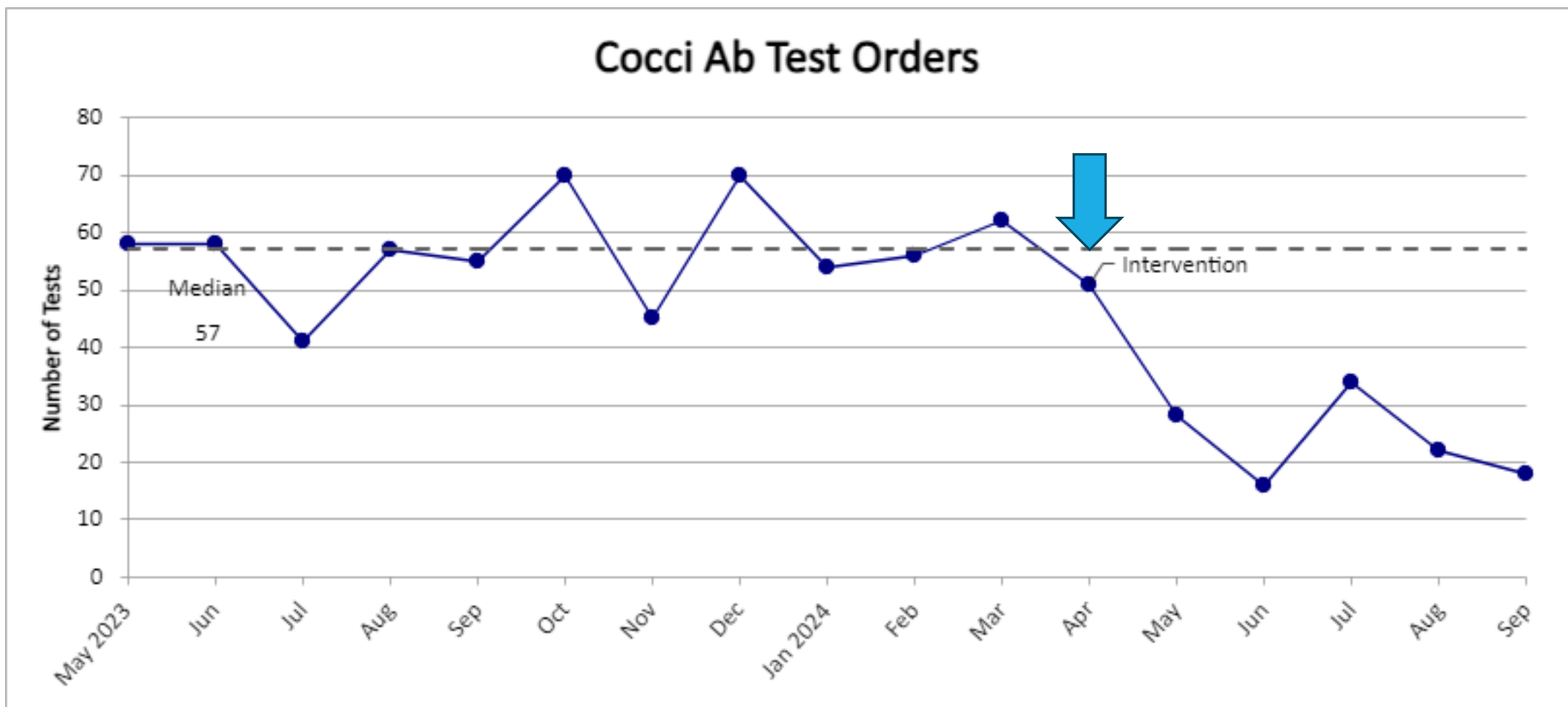
Blastomyces Ab Test Orders



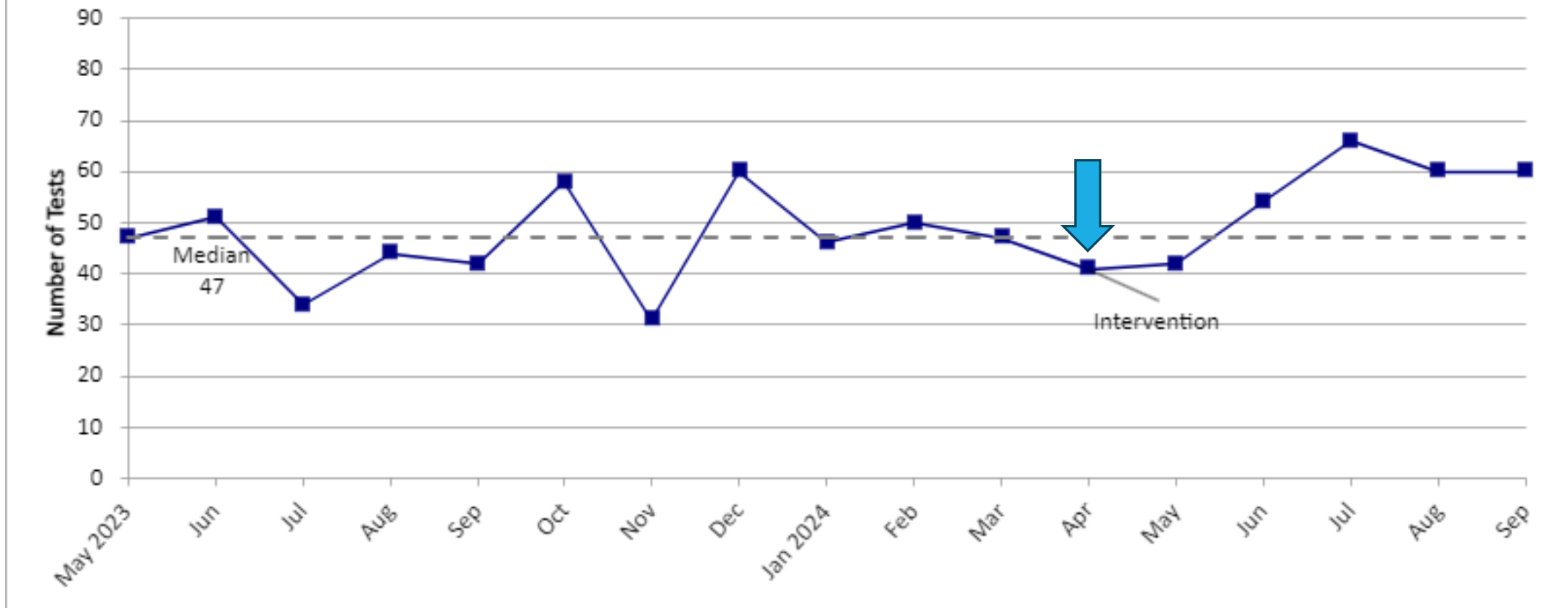
Aspergillus Ab Test Orders



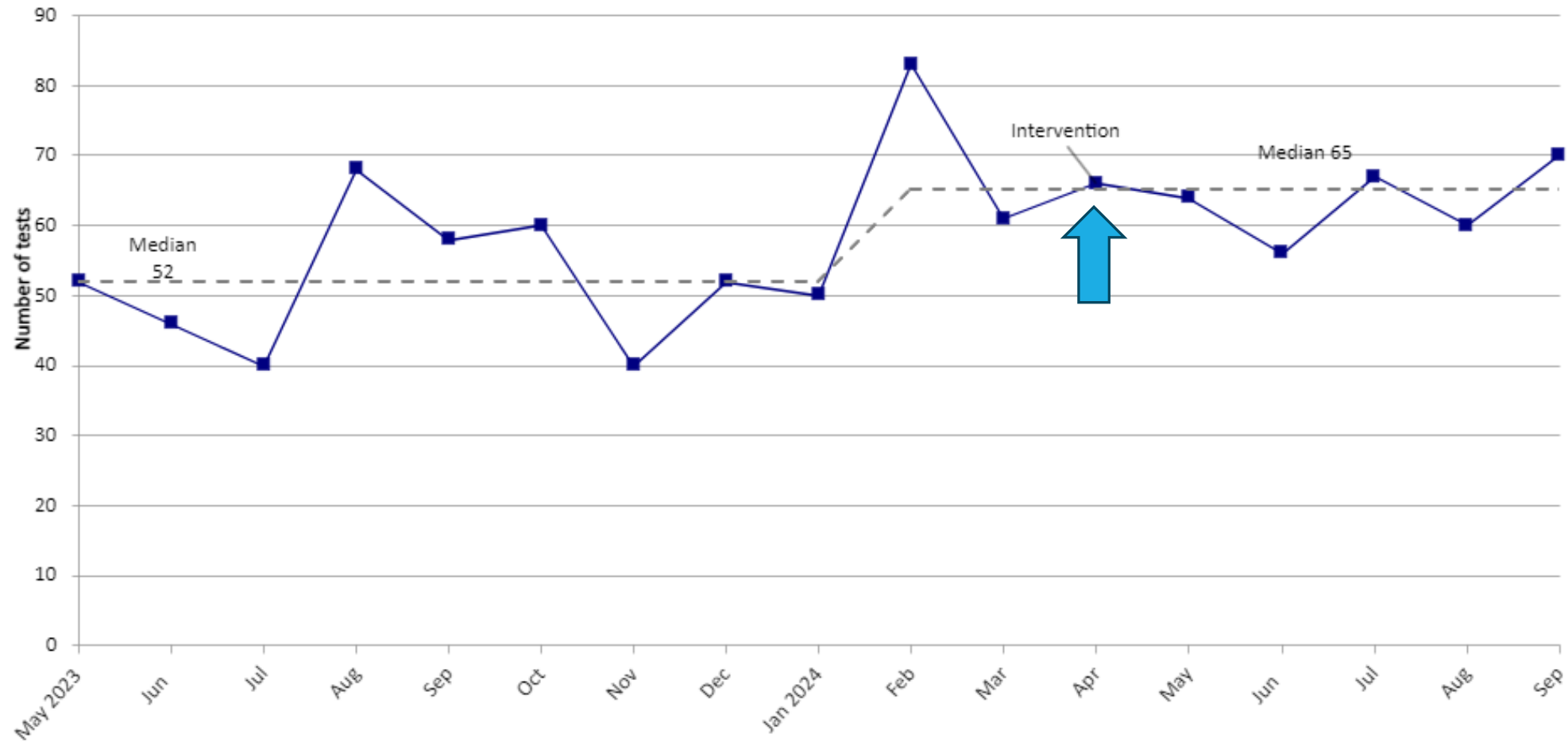
Cocci Ab Test Orders



Histo Ab Test Orders



Histo/Blasto Ag Test Orders



Cost Savings

- If current trends continue, we are set to save (per year):
 - 49k from reduction of Blastomyces Ab test orders
 - 33k from reduction of Aspergillus Ab test orders
 - 29k from reduction of Coccidioides Ab test orders
- Despite the increase in number of Histoplasma Antibody and Histoplasma/Blastomyces Urine Antigen tests, UNC is set to save ~90k yearly.